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STOPPING WATER POLLUTION AT ITS SOURCE



PROTOCOL FOR CONDUCTING A STORM WATER CONTROL STUDY



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**PROTOCOL FOR CONDUCTING A
STORM WATER CONTROL STUDY**

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FOREWORD

This protocol is to be used when conducting a Storm Water Control Study (SWCS) in accordance with the requirements of Sector Effluent Monitoring and Effluent Limits Regulations issued under the Ontario Environmental Protection Act.

The protocol outlines:

- the role and responsibilities of the discharger;
- the criteria that determine whether a plant may be exempted from the need to conduct a SWCS;
- the requirements for a storm water control study; and
- the requirements for developing a control program.

All dischargers identified in a sector effluent monitoring and limits regulation are required to conduct a storm water control study unless exempted under Part III of this protocol.

PART I. INTRODUCTION

As part of the strategy to meet the MISA goal of "virtual elimination" of persistent toxic contaminants from all discharges into Ontario waterways, control of contaminants in storm water runoff from industrial sites is required. The goal of storm water control is to reduce contaminant loadings to the maximum extent practicable and to ensure that storm water discharges are not acutely lethal.

Storm water is defined as rain-water runoff, snow melt, surface runoff and natural drainage from a plant site. Storm water discharges associated with industrial activity include but are not limited to discharges from drainage areas, drainage ponds, material handling sites, and raw material storage sites. Storm water which flows into process effluent which is then subjected to treatment is not storm water for the purposes of this protocol.

Most storm water drainage systems direct storm water and surface drainage towards natural receiving waters. While adequate for property protection and safety concerns, these practices could degrade the quality of receiving waters and result in reduction or loss of water uses where the storm water is contaminated.

Storm water discharges were monitored for all sectors, under the MISA Monitoring Regulations. In addition, information on site drainage was submitted by each discharger as part of an initial report. This work, provided preliminary information on the potential concentration/loadings of contaminants to the environment which is documented in the monitoring data report for each MISA sector.

The Sector Effluent Monitoring and Effluent Limits Regulations do not set limits for storm water discharges but require instead that each discharger conduct a Storm Water Control Study (SWCS) and prepare a report. The discharger is not required to submit the report to the Ministry for approval but must keep the report on file, and make the information available to the Ministry upon request.

In conducting a SWCS, a discharger shall:

- determine the quantity and quality of storm water discharges;
- identify all known sources of storm water contamination;
- identify the need for control based on the nature of the problem(s);

- evaluate control and prevention measures;
- develop a storm water control program (SWCP) which identifies preferred control or prevention measures where necessary.

A discharger is relieved of the obligation to conduct a SWCS subject to the exemption criteria set out in Part III of this protocol.

Where the quality of storm water identifies the need for prevention or control measures, the Ministry urges all the discharges to voluntarily implement the preferred prevention and control measures identified in the SWCP, as expeditiously as possible, as a contribution towards a cleaner environment.

Implementation of a SWCP may result in the construction of sewage works, which will require the discharger to make an application for approval under the Ontario Water Resources Act. This Act defines "sewage works" to include storm sewers and storm water control facilities.

PART II. ROLE OF THE DISCHARGER

Unless exempt under Part III of this protocol, it is the responsibility of a discharger to:

- comply with the requirements of the Sector Effluent Monitoring and Effluents Limits Regulation by carrying out a SWCS and preparing a report within the time frame stipulated in the regulation;
- ensure that all requirements outlined in this protocol are followed;
- collect the information required by this protocol, prepare a report, keep it on file, and make the report available to the Ministry upon request for review.

It is recommended that a discharger contact the appropriate Municipality, Conservation Authority, or office of the Ministry of Natural Resources to determine if a watershed management plan is in place and, if so, whether the plan should be considered during the development of a SWCS.

Where a discharger meets the exemption criteria set out in Part III, and is thereby relieved of the obligation to conduct a SWCS, the discharger must inform the "Director" in writing, by the due date, that an exemption is being claimed.

PART III. EXEMPTION CRITERIA

Each Sector Effluent Monitoring and Effluent Limits Regulation allows the discharger to be exempted from conducting a storm water control study provided the discharger meets certain criteria.

For the purposes of determining exempt status, large complex plants may choose to divide their sites into exempt and non-exempt areas where it is possible to clearly differentiate the two.

Criteria

The discharger may claim an exemption for:

- (i) all storm water discharges within the site (or within the area for which the discharger is claiming an exemption), that are not associated with any current or past industrial activity (i.e storm waters which do not come into contact with raw material, material handling sites, storage sites, products, and by-products);
- (ii) all storm water discharges associated with employee parking lots, administration buildings and landscaped areas that are not mixed with storm water associated with the types of industrial activities identified in (i);
- (iii) all storm water discharges within the site (or within the area for which the discharger is claiming exemption), that are directed to a sewage works, for which a Certificate of Approval has been issued by the Ministry under the Ontario Water Resources Act, for collection, transmission, treatment and disposal;
- (iv) all storm water discharges within the site (or within the area for which the discharger is claiming exemption), that mix with process effluent and are subsequently monitored under the MISA Sector Effluent Monitoring and Effluents Limits Regulation.

Where a study which meets the requirements of this protocol has been completed within 5 years of the date on which the Sector Effluent Monitoring and Effluents Limits Regulation came into force and no changes have been made to the plant since the completion of the study, the discharger may use the results of that study for the purposes of a SWCS report.

Record Keeping

All information in support of a claim for exemption shall be kept on file and made available to the Ministry upon request. Typical information would include:

- (i) a schematic showing plant layout and collection systems for all storm water;
- (ii) all available storm water monitoring data, including measured or estimated storm water volumes relative to volumes of other plant process and cooling water discharges;
- (iii) loadings of any storm water discharges that are treated separately from the process effluents; and
- (iv) a description of existing treatment processes and site practices for the management of storm water including the volumes and location of inputs, by-passes, treatment, retention, equalization, and recycling operations; as well as the analyses of treated storm water quality, sampling schedules, and sampling and analytical procedures used.

PART IV. STORM WATER CONTROL STUDY (SWCS) REQUIREMENTS

The SWCS may vary with each plant site. As a minimum, to ensure that all areas of potential concern have been adequately covered, a discharger shall carry out the following activities:

1. Collect and analyze samples for at least four representative storm events from storm water outlets for the different plant areas (i.e. process, storage, and loading and unloading of any raw material, intermediate products, finished products, byproducts or waste products) to determine the contaminants present in storm water and the acute lethality of the storm waters to rainbow trout and Daphnia magna.

It is recommended that at least one sampling event be carried out during the spring thaw.

¹ Representative storm events are those events that are greater than five millimetres of rain in a twenty-four hour period, as measured by a rain gauge for the plant or at a local Environment Canada meteorological station, and preceded by at least 48 hours of no precipitation.

Unless otherwise stated in the Sector Effluent Monitoring and Effluents Limits Regulation, the storm water samples shall be analyzed for the same parameters required for process effluents and cooling water effluents for the plant, under the regulation.

Two types of samples are required during each representative storm event:

- The first is a "first flush grab sample" collected during the first 30 minutes of the storm event.
- The second type can be one of the following:
 - a flow proportional composite sample;
 - an equal time/equal volume composite sample; or
 - three grabs taken at equally spaced time intervals over the three hours following the first flush, or the entire storm event if the event is less than three hours.

For plants with two or more storm water outfalls, a discharger may sample and analyze only one outfall provided the discharger can demonstrate that the outfalls discharge drainage from areas which are undergoing similar industrial activities at the site and that the discharges are expected to be of similar quantity and quality.

If the storm water is discharged through cooling water streams which are being monitored under the Sector Effluent Monitoring and Effluent Limits Regulations, for the purposes of the SWCS, the discharger shall monitor these cooling water streams for the same parameters required under the regulation for process effluents and cooling water effluents, on at least four occasions during representative storm events during the study period.

For plants which are required to analyze for chlorinated dibenzo-p-dioxin and dibenzofuran compounds, a discharger need only analyze for these compounds during the first two representative storm events provided that the measured levels during each event are less than the Regulation Method Detection Limit (RMDL) for each of the compounds as stated in the Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater.

Grab samples for rainbow trout and *Daphnia magna* acute lethality testing shall be collected during the first 30 minutes of the storm.

Each rainbow trout and Daphnia magna acute lethality test shall be carried out as a single concentration test using 100 per cent effluent.

The rainbow trout and Daphnia magna acute lethality tests shall be performed according to the procedures described in the Environment Canada publications:

- "Reference Method for Determining Acute Lethality of Effluent to Rainbow Trout" dated July, 1990; and
 - "Reference Method for Determining Acute Lethality of effluents to Daphnia magna" dated July, 1990.
2. Prepare a site map showing sampling locations and the outline of drainage areas served by each storm water sewer, process sewer, cooling water sewer.
 3. Determine the daily rainfall and monthly total rainfall over the study period, estimate the total area drained by each sewer as well as the total area of impervious surfaces on the site, including paved areas and building roofs.
 4. Estimate the volume of storm water discharged during representative storm events, using methods based on rainfall, drainage areas and runoff coefficients or based on calculated flow rates. Assess the accuracy of the methods used.
 5. Verify that no process effluent or contaminated ground water is being discharged through storm sewers.
 6. Calculate loadings of untreated storm water discharges.
 7. Prepare a report of the study which shall include, as a minimum, the following information:
 - a. A record of the result of each activity required by sections 1 to 6 of Part IV of this protocol.
 - b. Identification of sources of potential storm water contamination that may result from materials that are or have been treated, stored or disposed of on site.
 - c. The relative contribution of the loadings resulting from the storm water discharges to the daily plant loadings from process effluent and cooling water.
 - d. Results of the rainbow trout and Daphnia magna acute lethality testing of storm water effluent streams and the probable sources of any lethality.

- e. A description of prevention and control measures that are presently used to reduce contamination of storm water.
- f. A description of prevention and control measures that could be used to reduce contamination of storm water.
- g. An evaluation of prevention alternatives, that consider, as a minimum, the following measures:
 - interception of storm water in and around areas of storage, loading and unloading of any raw material, intermediate products, finished products, by-product or waste product;
 - reduction of the accumulation and/or deposition of debris;
 - control of the discharge from roofs or other catchment areas;
 - control of contamination through the separation of interconnected collection systems;
 - inclusion of reuse/recycling of storm water for industrial purposes;
 - good housekeeping (i.e. spill cleanup), and employee training and education.
- h. An evaluation of control alternatives that consider, as a minimum, the following measures:
 - oil/grit separation;
 - sedimentation facilities;
 - storm water retention ponds that provide a minimum of 24 hours retention for the runoff produced by 25 millimetres of rainfall in a 6 hour period;
 - biological treatment systems;
 - screening;
 - spill control;
 - infiltration techniques (where applicable); and
 - decontamination of soils which may come into contact with storm water.

- i. A framework of a Storm Water Control Plan based on an evaluation of the measures for prevention and control which shall include, as a minimum, the following:
 - i preferred methods for controlling storm water discharges at the discharger's plant;
 - ii a timetable and costs for implementation of the preferred methods described in (i) above.

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